CLAIMS

What is claimed is:

1. A method comprising;

depositing a first metal layer on a portion of a substrate;

depositing a dielectric layer upon the substrate such that the first metal layer is covered by the dielectric layer;

etching the dielectric layer to form a trench in the dielectric layer such that the first metal layer is exposed;

depositing a layer of ferroelectric polymer film on the substrate such that the trench is at least partially filled with a ferroelectric polymer film, the ferroelectric polymer film covering the first metal layer; and

depositing a second metal layer on the ferroelectric polymer film layer such that the ferroelectric polymer film is not substantially degraded.

2. The method of claim 1 wherein the method further comprises:

selectively depositing a diffusion barrier layer on the first metal layer prior to depositing the layer of ferroelectric polymer film.

3. The method of claim 2 wherein the diffusion barrier layer is a conductive material that adheres to the ferroelectric polymer film and does not interact with or outgas into the ferroelectric polymer.

4. The method of claim 2 wherein the diffusion barrier layer is selected from the group consisting of cobalt and nickel.

5. The method of claim 1 further comprising:

removing excess ferroelectric polymer film using a low-temperature process prior to depositing the second conductive layer such that the ferroelectric polymer film is not degraded.

6. The method of claim 5 wherein the low-temperature process is a low-temperature oxygen-based ash process.

7. The method of claim 1 wherein the ferroelectric polymer film is etched within a tolerance of less than or equal to 10% of a trench depth.

8. The method of claim 1 wherein the ferroelectric polymer film is confined within the trench and wherein the ferroelectric polymer film is bounded on the bottom by the first metal layer and bounded on the top by the second metal layer.

9. The method of claim 7 wherein the ferroelectric polymer film is deposited using a spin-coat process.

10. The method of claim 1 further comprising;

depositing a second diffusion barrier layer on the ferroelectric polymer film prior to depositing the second metal layer.

11. The method of claim 10 wherein the second diffusion barrier layer is deposited using an evaporation process.

12. An apparatus comprising:

a substrate:

a first metal layer deposited on the substrate, the first metal layer forming a first electrode of the ferroelectric polymer memory device;

an etched dielectric layer deposited upon the substrate, the etched dielectric layer having a trench formed therein such that the first metal layer is exposed;

a ferroelectric polymer film layer deposited on the substrate such that the trench is at least partially filled with a ferroelectric polymer film, the ferroelectric polymer film covering the first metal layer; and

a second metal layer deposited on the ferroelectric polymer film, the second metal layer forming a second electrode of the ferroelectric polymer memory device, wherein a surface comprised of the second metal layer and dielectric layer is planarized to a tolerance of less than 10%.

13. The apparatus of claim 12 further comprising:

a diffusion barrier layer disposed between the first metal conductive layer and the ferroelectric polymer film.

14. The apparatus of claim 13 wherein the diffusion barrier layer is a conductive material that adheres well to the ferroelectric polymer film and does not interact with or outgas into the ferroelectric polymer.

15. The apparatus of claim 14 wherein the diffusion barrier layer is selected from the group consisting of cobalt and nickel.

16. The apparatus of claim 12 further comprising;

a second diffusion barrier layer disposed between the ferroelectric polymer film and the second metal layer.

17. A ferroelectric polymer memory device comprising:

a substrate; and

one or more ferroelectric polymer memory blocks formed within the substrate, each ferroelectric polymer memory block having a bottom electrode, an etched dielectric layer deposited on the bottom electrode, the etched dielectric layer having a trench formed therein such that the bottom electrode is exposed, a ferroelectric polymer film layer deposited on the substrate such that the trench is at least partially filled with a ferroelectric polymer film, the ferroelectric polymer film covering the bottom electrode, and a top electrode wherein a surface comprised of the top electrode and the dielectric layer is planarized to a tolerance of less than 10% bottom electrode, a ferroelectric polymer film etched to a tolerance of less than or equal to 10% of a trench depth, and a top electrode.

18. The ferroelectric polymer memory device of claim 17 wherein the bottom electrode is formed from a metal, at least one of the memory blocks further comprising:

a diffusion barrier layer disposed between the bottom electrode and the ferroelectric polymer film of the at least one memory block.

19. The ferroelectric polymer memory device of claim 18 wherein the diffusion barrier layer is a conductive material that adheres well to the ferroelectric polymer film and does not interact with or outgas into the ferroelectric polymer.

20. The ferroelectric polymer memory device of claim 19 wherein the diffusion barrier layer is selected from the group consisting of cobalt and nickel.

21. The ferroelectric polymer memory device of claim 17, at least one of the memory blocks further comprising;

a second diffusion barrier layer disposed between the ferroelectric polymer film and the top electrode of the at least one memory block.

22. The ferroelectric polymer memory device of claim 21 wherein the second diffusion barrier layer is deposited using an evaporation process.

23. A system comprising:

a processor;

a memory device coupled to the processor, the memory device including one or more ferroelectric polymer memory blocks formed within a substrate, each ferroelectric polymer memory block having a bottom electrode, an etched dielectric layer deposited on the bottom electrode, the etched dielectric layer having a trench formed therein such that the bottom electrode is exposed, a ferroelectric polymer film layer deposited on the substrate such that the trench is at least partially filled with a ferroelectric polymer film, the ferroelectric polymer film covering the bottom electrode, and a top electrode wherein a surface comprised of the top electrode and the dielectric layer is planarized to a tolerance of less than 10%.

24. The system of claim 23 wherein the bottom electrode is formed from a metal, at least one of the memory blocks further comprising:

a diffusion barrier layer disposed between the bottom electrode and the ferroelectric polymer film of the at least one memory block.

25. The system of claim 24 wherein the diffusion barrier layer is a conductive material that adheres well to the ferroelectric polymer film and does not interact with or outgas into the ferroelectric polymer.

26. The system of claim 25 wherein the diffusion barrier layer is selected from the group consisting of cobalt and nickel.

27. The system of claim 23, at least one of the memory blocks further comprising;

a second diffusion barrier layer disposed between the ferroelectric polymer film and the top electrode of the at least one memory block.

28. The system of claim 27 wherein the second diffusion barrier layer is deposited using an evaporation process.